Space Weather Forecast

Issued on Saturday, 08 January 2022 at 12:35 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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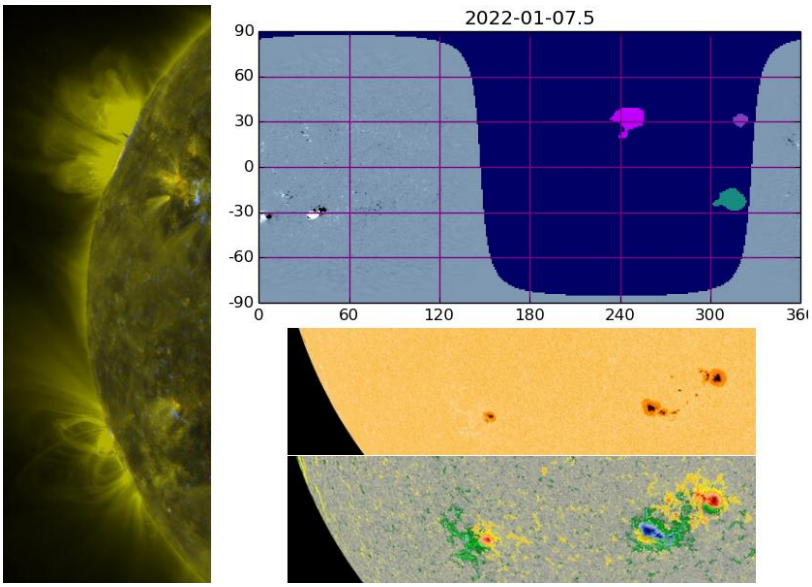
Space Weather Forecast Headline: Slight chance of G1/Minor Geomagnetic Storm over the UTC weekend. Increasing slight chance of Moderate-class flares (R1-R2 radio blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was low over the past 24 hours, with peak X-ray activity being an isolated common-class flare at 07/2210UTC from the largest sunspot group on the facing side of the sun. There are currently two sunspot regions on the visible side: the larger now nearing the solar meridian as a large magnetically bipolar group, with the second being a southeastern unipolar group. The trend in both these regions was towards consolidation, albeit with slight areal growth. The larger of the two groups saw some proliferation of intermediate spots in the first half of the period, however this behaviour waned as the period went on. In addition to these confirmed regions, the eastern solar horizon is bright in extreme UV flux in both hemispheres, likely indicating some returning suns[pot regions, although these have yet to present for analysis.

No Earth-directed Coronal Mass Ejections (CMEs) have been observed in currently available imagery.

Figure 1: Clockwise from top right: active region map, showing soundings of the sun's far side (coloured patches) - in particular the regions approaching the east; magnetic and visible imagery from 08/1200UTC showing the current magnetic configurations of the two sunspot groups on the current front side of the sun; composite extreme UV and magnetic image from 08/1200UTC showing bright flux from the eastern solar horizon.



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Solar Wind / Geomagnetic Activity: Solar winds were indicative of a slow regime, possibly evolving into a CIR (Co-rotating Interacting Region - a piling up of particles immediately ahead of 'coronal holes'), with this likely to be that preceding any entry into a forecast fast wind. The solar wind speed was largely flat at background levels, while the magnitude of the magnetic field associated with the solar wind was mostly within its typical slow regime range, but showed a slight late peak.

The net result of the above solar wind measures was quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain low, with further common-class flares possible. In addition, there is an increasing daily slight chance of moderate-class X-ray flares, as numerous large returning sunspot regions are expected to rotate onto the Earth-facing side during the current UTC weekend.

Solar Wind / Geomagnetic Activity: There are currently no Earth-directed CMEs that feature in the forecast, and just one non-recurrent 'coronal hole' fast wind. Quiet geomagnetic activity is expected at first, soon increasing to give a slight chance of G1/Minor Storms later on Day 1 into Day 2 (Sunday 09 January). Activity is currently expected to return back to quiet levels again from Day 3 (Monday 10 January).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although there is a slightly increasing risk with time with the usual 13 degree a day westward progression if the current front-sided sunspots.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	10	15	20	20
Very Active	R3 to R5 X	No	1	1	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	2	2
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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